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## ALGEBRA.

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96. Proposed by F. M. PRIEST, Mona House, St. Louis, Mo.

How many different numbers may be written with the nine digits and zero, using them singly and in groups of from two to ten digits each, and using no figure but once in each group? How many more numbers may be written by repeating the digits and zero at pleasure in each group?

97. Proposed by F. M. SHIELDS, Coopwood, Miss.

A farmer had 2080 pounds of grain at the depot, and gave a wagoner .75 cents per 100 pounds to haul it, paying him in the same grain at the following prices, viz.: 3-10 of the hauling bill was paid in corn at .58 cents per bushel of 56 pounds. 3-5 was paid in wheat at 1.55 cents per bushel of 60 pounds, and the balance of the bill was paid in oats at .36 cents per bushel of 32 pounds, the wagoner not charging for hauling his own grain. The load being delivered, how many bushels of each kind of grain did the wagoner get, and how many bushels of each kind did the farmer have left after paying the wagoner?

\*\*\* Solutions of these problems should be sent to J. M. Colaw not later than April 10.

## GEOMETRY.

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116. Proposed by P. S. BERG, A. M., Superintendent of Schools, Larimore, N. D.

Inscribe by rule and compass a regular heptadecagon.

117. Proposed by GUY B. COLLIER, Schenectady, N. Y.

If  $(x', y')$  and  $(x'', y'')$  are the extremities of a pair of conjugate diameters whose eccentric angles are  $\varphi'$  and  $\varphi$ , show that  $\varphi' + \varphi = 90^\circ$ ; given  $(x', y') = (a \sec \varphi', b \tan \varphi)$ . [From Nichols' *Analytical Geometry*.]

\*\*\* Solutions of these problems should be sent to B. F. Finkel not later than April 10.

## MECHANICS.

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84. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Two weights  $P$  and  $Q$  are fastened by a weightless string that is strung over a single movable pulley.  $P$  is greater than  $Q$ . The weight of the pulley is  $2R$ . Find the tension of the string, (1) when the friction of the string on the pulley is neglected, (2) when it is considered.

85. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio State University, Athens, Ohio.

A circular tube of radius  $a$  revolves uniformly about a vertical diameter with angular velocity  $\sqrt{\frac{ng}{a}}$ , and a particle is projected from its lowest point with such velocity that it can just reach the highest point; prove that the time of describing the first quadrant is  $\sqrt{\frac{a}{(n+1)g}} \log(\sqrt{n+2} + \sqrt{n+1})$ .

86. Prize Problem ; \$2.50 for the best solution.

Two spheres of equal size are in motion on a smooth horizontal plane, and, on meeting, their plane of contact coincides with the plane of the meridian. The sphere on the west side is perfectly elastic and weighs  $4\frac{1}{2}$  pounds, while previous to the impact it was moving N.  $30^\circ$  E. with a velocity of 15 feet per second. The sphere on the east side is perfectly plastic and weighs  $6\frac{1}{2}$  pounds, while previous to the impact it was moving N.  $45^\circ$  W. with a velocity of 10 feet per second. Determine the motions of the spheres after the impact.

\*\*\* Solutions of these problems should be sent to B. F. Finkel not later than April 10.

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## EDITORIALS.

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Our valued contributor, J. M. Bandy, A. M., Ph. D., is now engaged as chief engineer of the Cape Fear and Northern Railroad.

The mathematical text-books formerly published by Leach, Shewell & Sanborn, of Boston, have been purchased by D. C. Heath & Co. Among the most valuable of these text-books are Osborne's *Differential and Integral Calculus*, Nichols' *Analytic Geometry*, and Fine's *Number System of Algebra*.

Through the kindness of a subscriber, who desires that his name should not be mentioned, we are able to offer a prize for the best solution of Problem 86, Mechanics, published in this issue, furnished by a person under the age of twenty-one years. All solutions must be forwarded to B. F. Finkel on or before May 1, 1899. The object of the donor in giving this prize is to create an interest in mathematics among teachers and young people. The first, second, and third solutions in order of neatness and accuracy will be published.

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## BOOKS AND PERIODICALS.

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*Plane and Solid Geometry.* By James Howard Gore, Ph. D., Professor of Mathematics in Columbian University, Author of *Elements of Geodesy*, *History of Geodesy*, *Bibliography of Geodesy*, etc., etc. 8vo. Cloth, 210 pages. Price, \$1.00. New York : Longmans, Green & Co.

The object of this work seems to be to bring the study of Geometry within the minimum time requisite to gain a fair knowledge of it, in order that a proportionate amount of time may be given to other subjects. The author holds that since other sciences, and even language and philosophy, claim disciplinary merit equal to that possessed by mathematics, the time has come when we can afford to hearken to the demands of the utilitarians and give up those refinements in mathematics which have been retained for the mental discipline they bring about, but which are wholly lacking in practical application.